53 (IE 702) INSC

2016

INSTRUMENTATION SYSTEM COMPONENTS

Paper : IE 702

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions out of* ***seven.***

1. *(a)* Explain synchro transmitter. 8

   (b) Explain the construction and working of an AC tachogenerator. 12

2. *(a)* Explain the negative feedback principle. 6

   (b) How a servomotor works as an angular positioning device ? 6

   (c) Explain synchro pair. 8

3. *(a)* A stepper motor has a step angle of 5°. Determine *(i)* Resolution *(ii)* Number of steps required for the shaft to make 50 revolutions and *(iii)* Shaft speed, if the stopping frequency is 1200 *pps*. 6

(b) Explain the modes of operation of variable reluctance stepper motor. 14

4. *(a)* Design a PID controller having the output voltage ;

$$V_{out} = 10V_e + 2\int V_e dt + 40\frac{dV_e}{dt} + V_{out}(0)$$

Assume all capacitance as $0{\cdot}1\mu F$ and $f_{max\,i} = 1kHz$ 14

(b) Explain the working of a flapper valve. 6

5. *(a)* Design an electronic PI controller using the controller parameters ; $G_P = 5$ and $G_I = 0{\cdot}4$. Assume all capacitance as $0{\cdot}1\mu F$. 12

(b) Draw a electronic P and PD controllers. 8

6. *(a)* Explain a two stage valve using 4 way spool valves. 8

(b) Explain the construction and working of a check valve. 6

(c) Explain the hydraulic system. 6

7. *(a)* Explain a two stage valve using flapper valve and 4 way spool valve. 10

(b) Draw pneumatic P, PI and PD controllers. 10
